June 3, 1961

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SCIENCE NEWS LETTER

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See page 344

A SCIENCE SERVICE PUBLICATION

PUBLIC SAFETY

Educate on Drunk Driving

➤ CONCENTRATION on high school age education against drinking-driving was advised as one of the best ways of educating the public on its dangers.

Routine campaigns are not enough to stop drunken driving, Donald Cahalan, president of American Research Bureau Surveys, New York, told the National Conference on Alcohol and Traffic Safety in Pittsburgh, Pa.

Members of the high school group could have more effect on the teenagers than policemen if their leaders would earnestly present the harm in drinking and driving, he said.

Shock pictures and other anxiety-producing methods are likely to be ineffectual unless constructive guidance is given, and any educational campaign should promise rewards for good behavior rather than mere punishment for wrongdoing.

Uniform methods of using chemical tests (degree of alcohol in the blood) as evidence of fitness to drive would probably help to raise the level of public cooperation in the drinking-driving problem, Mr. Cahalan said.

In addition to intensifying the high school driver training program, the speaker advised "upgrading of the status of the driver's license." This could be done by more intensive testing, establishing higher qualifications, and using various grades of licenses and insurance differentials as rewards for careful driving.

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Party Hosts to Blame

➤ PARTY HOSTS encourage drunken driving by pressing drinks upon their guests, it was reported at the National Conference on Alcohol and Traffic Safety in Pittsburgh, Pa.

Dr. Ira H. Cisin, director of the Drinking Practices Study in Berkeley, Calif., told the conference that the party host is afraid of being thought stingy unless he keeps glasses filled. A new basis for group approvals, founded on scientific studies and supported by basic social custom, should be found, Dr. Cisin said, but the public must care enough about the problem to find practical ways of solving it.

Rigid enforcement of speed and traffic laws, restriction of licenses of drunken drivers, party pools in which nondrinkers drive, possible automatic devices on the road that would stop cars swerving from the correct lane were among the suggestions made.

Self-evaluation devices could be used, Dr. Cisin suggested.

It might become quite a game at parties to test oneself with a little puff-meter. For those who fail the test, it is not inconceivable that a sobering pill could be developed to counteract the effects of alcohol.

Any solution to the problem of drunken driving is dependent upon willingness of the drunken driver to avoid driving while drunk. Achievement of this willingness in itself offers a challenge to the public's "skill in mass motivation and the engineering of attitude change," Dr. Cisin said.

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PUBLIC SAFETY

Accident-Prone Persons Impulsive, Rebellious

➤ PERSONS who always seem to have accidents are generally impulsive, rebellious against authority and want to punish themselves.

These characteristics continually crop up in psychiatric studies, Dan D. Gowings of the Pennsylvania Department of Health, Harrisburg, reported at the Building Research Institute meeting in Washington, D. C.

The accident-prone person gives little thought to planning and anticipating future pleasures. The rebellion against authority is carried over from childhood experiences, and the hostility even applies to safety rules and regulations, Mr. Gowings said. This results in a higher than average percentage of accidents in the home for these persons.

The need for self-punishment (accident) supposedly salves the guilt resulting from the hostile feelings of the accident-prone person.

However, the study also revealed that persons are accident-prone for only a certain period in life, and the accident-prone group actually changes from time to time.

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PUBLIC HEALTH

Water Pollution Bill Facing Opposition

➤ A STRONG water pollution control bill, designed to put teeth in the fight against this United States blight, is experiencing rough going in the Senate.

The bill, already passed by a resounding vote in the House, is now being thrashed out in the Senate Public Works subcommittee, headed by Sen. Robert S. Kerr (D.-Okla.), a sponsor of another water pollution control bill. Recent subcommittee hearings pinpointed important differences in the two bills that may have to be settled by a House-Senate conference committee on the important measure.

The House bill, introduced by Rep. John A. Blatnik (D.-Minn.) strongly reinforces the Federal Water Pollution Control Act of 1956. It increases the annual appropriation for Federal grants to construct state-approved waste treatment plants from the current $50,000,000 to $100,000,000, and provides Federal control of interstate and intrastate coastal and navigable waters, only if the action is requested by a state or by a city with the state's approval. The present law is limited to intrastate waters although waters ignore such artificial boundaries as state lines.

Sen. Kerr's bill asks for $75,000,000 in grants, and would not give the Federal Government the enforcement powers recommended by Rep. Blatnik. Instead the Senator strongly urges that waters held back by Federal dams be released during low flows to prevent waters from stagnating and becoming polluted. Other provisions of the two bills, such as more funds for research and construction of field laboratories, are quite similar.

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PUBLIC SAFETY

Shark Control Research

➤ THE "BUBBLE CURTAIN" supposedly so terrifying that sharks will not swim through it even for a juicy steak is not reliable, shark experts have reported.

The American Institute of Biological Sciences, the American Museum of Natural History, the Office of Naval Research and Cornell University announced jointly that the bubble curtain had been retested with tiger sharks, some of the most vicious sea animals.

Dr. Perry W. Gilbert, a Cornell zoologist, supervised tests at Bimini, B.W.I., and found that tiger sharks quickly adjusted to the presence of the curtain, created by forcing compressed air through perforated pipes laid on the bottom of the tank. Most ignored it after the first hour, he said. Throughout the various tests, only one shark of nearly 100 tested was repeatedly turned by the bubble curtain. The great majority swam freely back and forth through it.

At the Symposium on Oceanography in the Midwest, another shark expert corrected another misconception about sharks.

Dr. Fritz F. Koczy of the University of Miami reported that contrary to popular belief, sharks can smell blood only from a few hundred feet away, not from miles away. However, a shark can hear underwater sounds for several miles and he probably uses this ability to get within smelling distance.

Dr. Warren Wisby, also of University of Miami, is studying the range of shark hearing. Using electrical shock, a microphone that sends out sounds ranging from 15 to several thousand cycles per second and an echo-proof, underwater tunnel, Dr. Wisby has trained his sharks to anticipate shock when they hear a sound. The trained shark's heart begins to race madly when the animals perceive sound. By monitoring the heart, the scientist can tell when the animal is hearing the sound and can thus establish the hearing range, which is now being done.

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SPACE

Satellites for Television

Low-flying satellites for telephone and television communication will be faster to build than high-flying ones, a scientist reports to First Conference on Peaceful Uses of Space.

➤ LOW-FLYING satellites that rise and set in the sky will be the best for sending telephone messages and television signals around the earth, one authority has reported.

Such a satellite, just a few thousand miles up, could be built much sooner than a 24-hour satellite that stands at all times over the equator 22,300 miles up, Dr. J. R. Pierce of the Bell Telephone Laboratories, Murray Hill, N. J., said.

He told the First National Conference on Peaceful Uses of Space in Tulsa, Okla., that the low-altitude satellite could be made lighter than the high-altitude ones so that several could be launched with one shot. They could also be made reliable sooner and provide a given amount of world-wide communication more cheaply.

Another advantage of low-altitude satellites that sweep across the sky is that if one of many satellites fails, only a small link in a chain is broken and the system as a whole keeps working. If a high-altitude, 24-hour satellite that beams over a larger area fails, system effectiveness is greatly cut down.

A distinct disadvantage with the 24-hour satellite, he pointed out, is that it would take half a second longer to hear a telephone conversation over this system than it now does with transoceanic cables.

Long-lived satellites must be developed for this type of communication, since the initial cost of sending them into orbit around the earth is high. However, once such satellites can function for a number of years they will be technically superior to present day methods of sending TV and telephone signals.

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SPACE

Sterile Space Probes

➤ THE NATIONAL Aeronautics and Space Administration has awarded a contract for research work on developing means of sterilizing vehicles destined for outer space.

The move results from increasing concern that future space probes may accidentally contaminate other space bodies.

The $106,000 contract went to Wilmot Castle Co., Rochester, N.Y., manufacturers of sterilizers and related equipment for hospitals and industry.

Purpose of the 12-month project is development of standard operating procedures for sterilizing each missile component or space probe assembly. The company will emphasize sterilization by dry heat, but will utilize radiation and chemical disinfectants for items that cannot be heat-treated. Treatments must be devised that will not affect operation of components or make changes in basic materials necessary.

Exteriors of space craft can be sterilized by applying such gaseous sterilants as ethylene oxide. But sealed components, which might be shattered upon landing, must be internally sterilized before they are sealed.

The NASA and the U. S. Army Chemical Corps have been actively investigating prevention of extraterrestrial biological contamination for some time. The contention is that no probe should be launched toward Mars, Venus or the moon, if there is as much as a one-in-a-million chance that it will land a living organism on their surfaces.

Maximum precautionary efforts are considered vital to assure that artificial spreading of living earth forms does not complicate future studies of life beyond earth.

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SPACE

Solar Probe Can Skim Close to the Sun

➤ A SOLAR SATELLITE could be sent as close as 4,600,000 miles to the sun and still withstand the intense heat. This would be well within the orbit of the planet Mercury, which is 36,000,000 miles from the sun.

The National Aeronautics and Space Administration reported that speeds ranging between 51,000 and 100,000 feet per second would be needed to send a satellite even as far as a third of the way to the sun, which is 93,000,000 miles from the earth.

The space agency said the best way to launch a solar satellite into orbit would be in a direction opposite from that of the earth around the sun. That way the satellite's closest approach to the sun would be in months rather than in years.

If the probe was launched in the same direction that the earth is traveling around the sun, a second impulse would be needed one or several years after launch to head it toward the sun. This would decrease its reliability. Possibility of damage from meteors would also be increased as would the requirements on instruments.

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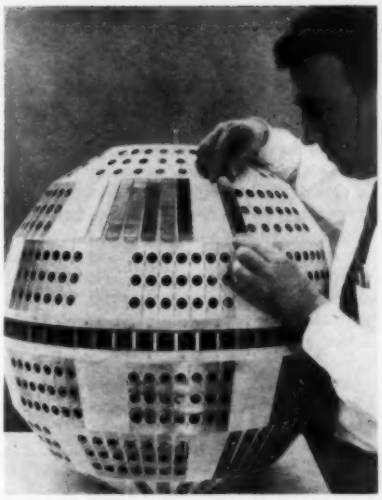

SAPPHIRE COVERING

SPACE

Sapphires Will Protect Satellite Solar Cells

➤ THOUSANDS of pieces of man-made sapphire, designed to protect solar cells from space radiation, will cover communications satellites now being developed by Bell Telephone Laboratories.

Dr. James B. Fisk, company president, said the sapphires should enable a system of telephone satellites to endure electron and proton bombardment ten years or more while serving as radio relay stations for overseas communications.

Sapphire sheathing will cover solar cells made of silicon and mounted on the satellite surface to convert sunlight to electricity. Dr. Fisk, speaking at the meeting of the American Iron and Steel Institute in New York said Bell wants to put the system into operation as soon as possible, and has offered to pay rocket and launching costs.

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SPACE

Atomic Energy Seen Best for Rocket Power

➤ ATOMIC ENERGY is the most feasible source for powering rockets into the far reaches of outer space.

A refined model of a nuclear power system now being developed could be used to propel space probes to Mars and Venus, Dr. Glenn T. Seaborg, chairman of the Atomic Energy Commission, told the American Ordnance Association in San Francisco.

Already it is feasible to put an "atomic generator" in a satellite whirling around the earth to supply electric power. This generator, weighing four pounds, could produce electricity, equivalent to thousands of pounds of batteries, over a five-year period, Dr. Seaborg said.

Atomic energy can also be used in a world-wide network of television satellites or weather stations, the scientist noted.

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MEDICINE

Link Additives and Cancer

➤ LIVER CANCERS found in rainbow trout of western hatcheries have yielded an important link in understanding the cause of cancer, since the outbreaks of liver cancer are believed due to food additives.

Although the physiology of fish does not exactly parallel that of mammals, new avenues for investigation have been opened up by finding "an animal population 100% involved by tumor," Drs. E. M. Wood and Charles P. Larson of the Tacoma General Hospital, Tacoma, Wash., said.

At every hatchery where the disease was observed, the same pelleted food diet has been fed for varying periods. The dry pellets contain vitamins, antioxidants, growth stimulants and other additives designed to replace factors in fresh meat.

The scientists state that lack of balance in the diet could not be ruled out as a cause of the cancer. However, the rapid growth of affected fish indicates that nutritional factors are not the primary cause. A chemical or cancer-causing hormone "appears to be a possible cause," they report in the Archives of Pathology, 71:471, 1961, published by the American Medical Association.

There was a direct correlation between the severity of the disease and the length of time the diet was fed. In other hatcheries in the same localities where fish were of the same genetic strain but fed a different diet, the disease was not found.

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MEDICINE

Mice and Man Leukemias

➤ THE LEUKEMIAS, or blood cancers, of man and mouse are closely related and probably caused by virus, scientists at the Hektoen Institute for Medical Research and Cook County Hospital in Chicago have shown by animal skin tests.

The American Cancer Society, which supports research by the scientists, Drs. Irving Greenspan and Steven O. Schwartz, reported their findings.

Experiments were conducted with filtered leukemic material made into a vaccine and injected into normal persons who volunteered. Guinea pigs were injected with the vaccinated persons' blood serum, containing anti-leukemia antibodies.

Then material obtained from leukemic tissues was injected under the guinea pigs' skin and they reacted with a welt, showing that antibodies were present in the previously injected serum.

But when the scientists injected serum from leukemic patients into guinea pigs and then followed these injections with leukemic tissue extracts no welts or other signs of antibodies to the leukemia could be seen.

This meant that for some reason the blood of leukemic persons did not contain antibodies against leukemic viruses.

The experiments were part of a series to determine whether a virus is involved in the cause of leukemia. While a dozen or so cancers in animals have been shown to be caused by viruses no virus so far has been demonstrated to cause any human cancer.

If a cancer-causing virus exists as a cause of human cancer, it must be obtained in pure form before progress can be made toward producing vaccines for the prevention of leukemia, as smallpox and polio can be prevented today.

The finding that leukemic mice and humans, treated and untreated, lack antibodies against leukemic material raises the question of how this natural resistance can be restored once it has disappeared. The control of leukemia may hinge on the answer to this question.

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GENERAL SCIENCE

College Research Boom

➤ ALMOST 70,000 scientists and engineers, representing 44% of the total at United States colleges and universities, were working in research and development during 1958, the latest year for which figures are available, the National Science Foundation reported in Washington, D. C.

The survey showed that the 377 reporting colleges and universities increased their money allocation for research and development from $410,000,000 in 1954 to $736,000,000 in 1958.

But the number of faculty members engaged in research and development did not rise proportionally. Instead, the three percent increase during the same four-year period indicates more use of faculty time for such work, rather than more new manpower.

The actual number of faculty members working at research and development full-time rose from about 7,000 to 10,400—32% of the total, compared to 22% four years earlier.

Of the 69,919 scientists and engineers, 47% were employed in the life sciences, 26% in the physical sciences, 17% in engineering sciences and 10% in social sciences.

Classified by sources of support, 28,413 or 40% depended entirely on funds from outside the institutions, 14,689 or 20% depended on combinations of outside funds and institutional funds, and the remainder depended entirely on institutional funds.

For survey purposes, research was defined as "systematic, intensive study directed toward fuller knowledge of the subject," and development as "the systematic use of knowledge directed toward the design and production of useful prototypes, materials, devices, systems, methods or processes."

The Health, Education and Welfare Department's education office conducted the survey, using 1,916 questionnaires.

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MEDICINE

Pets Get Owners' TB

➤ HOUSEHOLD PETS carry a risk of getting tuberculosis if their owners have TB, a Scottish physician reported.

The question of whether the pet more often infects the human or the human the pet has not been answered. The probability is that the human more often infects the pet, Dr. V. M. Hawthorne, assistant medical director, Glasgow Mass Radiography Service, said.

Among 31 dogs that died of tuberculosis, Dr. Hawthorne found 16 had owners infected with TB. In five cases, the disease was traced to neighbors, and in two cases to a former owner.

Among 13 apparently healthy dogs in contact with tuberculosis, eight had a positive reaction to BCG, the weakened strain of bovine tubercle bacilli frequently used as a vaccine. BCG was used instead of the tuberculin skin test because the latter is not a satisfactory method of testing cats and dogs. Three of nine cats similarly tested showed a positive reaction to the BCG.

The risk from the tuberculous pet differs little from that of the tuberculous human, although further investigation is needed, Dr. Hawthorne told the National Tuberculosis Association and its medical section, the American Thoracic Society, in Cincinnati, Ohio.

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Drug for Fungus Disease

➤ A NEW ANTIBIOTIC for treating lung diseases caused by a fungus has been developed.

Tried on a small number of patients, the drug proved particularly effective in treating histoplasmosis, a disease native to the Mississippi and Ohio River Valley areas. Some 30,000,000 persons are believed infected with the causative agent.

Dr. John B. Utz of the Infectious Disease Service, National Institutes of Health, Bethesda, Md., reported that four of five patients with disseminated histoplasmosis, usually fatal, recovered. The fifth received the drug for too short a period to evaluate its effectiveness, he reported at the meeting of the National Tuberculosis Association and its medical section, the American Thoracic Society, in Cincinnati, Ohio.

Dr. Utz, in charge of the drug's clinical trials, also reported improvement in patients with chronic histoplasmosis, lung cavities and blastomycosis. Human patients with coccidioidomycosis, or San Joaquin Valley fever, a disease caused by infection of the lungs, did not respond. But results were promising in animals with experimental coccidioidomycosis, indicating that procedural changes may improve results in man, Dr. Utz said.

The drug, not officially named, is tentatively tabbed X-5079C. Derived from a new species of Streptomyces, it was discovered during a routine sampling of soil for antibiotics. It is administered by skin injections. Amphotericin B, the only other available drug for treating fungus diseases, is injected into the vein.

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TB Control Threatened

➤ WARNINGS against the dangers of overconfidence about wiping out tuberculosis were sounded at the annual meeting of the National Tuberculosis Association in Cincinnati, Ohio.

Dr. Walsh McDermott of New York Hospital-Cornell Medical Center, New York, said man has made extraordinary progress in increasing knowledge of disease prevention and treatment, but has not been successful in convincing his fellow man to take advantage of available methods of dealing with infectious disease.

Good drugs are at hand today for tuberculosis treatment, he said, but the question is how to get the patient and the drug together. He said volunteer tuberculosis workers, working with health agency representatives, can aid in locating patients. Once the patient is found, "the community must insist that adequate chemotherapy is available to him."

Dr. McDermott sees a setback in the gains made to eradicate tuberculosis in human beings unless the obligation to treat all patients with active tuberculosis is met. Drug therapy should be made available to those deemed in danger of relapse, he said.

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Tuberculosis in Cattle

Dr. W. W. Armistead, dean of the College of Veterinary Medicine at Michigan State University, East Lansing, termed the campaign against tuberculosis in cattle, begun in 1917, a "success story." But he pointed out that the number of tuberculin test reactors among cattle has increased during the past few years, establishing that "eradication of a widespread infectious disease becomes more difficult in the final stages." Public complacency, he said, is "a growing obstacle as an eradication campaign proceeds."

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TB Germ Foils Cancer

➤ PARTS OF the tuberculosis germ have produced immunity to some types of cancer as well as to tuberculosis when given to laboratory animals, Dr. David W. Weiss of the University of California, Berkeley, reported to the National Tuberculosis Association and its medical section, the American Thoracic Society, meeting in Cincinnati, Ohio.

BCG, the strain of weakened live tubercle bacilli used as a vaccine, and several nontoxic fractions of the bacillus that increase resistance to tuberculous infections in animals, are active against a variety of bacterial infections and against several types of malignant tumors, Dr. Weiss said.

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RIDE ON AIR—A stretcher-carrier, developed by Folland Aircraft, Southampton, England, gives a joltfree ride to patients. The vehicle is supported by a chamber of air cushions.

EDUCATION

Teacher Training Liberal

➤ THE AVERAGE school teacher gets a far more liberal education than many other professionally trained persons, a national study shows.

A survey report by the Institute of Higher Education of Teachers College, Columbia University, stresses "generous elective privileges" that give teachers the chance to "broaden and enrich their education in liberal arts subjects." Heavy professional requirements for students in other fields make it difficult for them to study outside their special area.

Critics who blame shortcomings of the school system on too many "methods" courses for teachers are "using a fiction to come to grips with a reality," the study contends.

Much criticism of teacher education is believed based on poor judgment, misinformation and "armchair opinion." The report also asserts that many specialists who criticize teacher training are less interested in furthering the cause of liberal education than in replacing courses in teaching with courses in their own specialized subject matter.

Colleges requiring "entirely too much" instruction in teaching methods—as much as 53% of the curriculum—are not typical, the study showed.

A sampling of 35 teacher-training institutions showed elementary school teachers received an average of 36% of their total instruction in professional studies. Secondary teachers devoted only 17% of their learning to such studies.

By contrast, typical engineering and pharmacy schools require 45% of all studies in technical subjects. The average for business administration is 47%; nursing, 52%; and music, 68%.

The average engineering student is allowed only five percent of his instruction in elective courses of his own choice. The average pharmacy student is allowed four percent. But 39% of the education of secondary school teachers is allowed in electives, and elementary teachers get an average of 16%.

Moreover, many of the education courses rated in the professional category are not "methods" courses, but studies of the history, philosophy and psychology of education. Properly taught, they can contribute as much to a liberal education as courses in literature or science.

The study was directed by Dr. Earl J. McGrath, Institute executive officer and former U. S. Commissioner of Education, with the help of Dr. Charles H. Russell, Institute research assistant.

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GENERAL SCIENCE

Hedge Apples as Food

➤ CONCERN OVER the world's increasing need for new food materials led a 17-year-old student scientist to investigate nutritional possibilities of the Osage orange, or common hedge apple.

The project, conducted by Victoria Sue Richards, a senior at Garfield High School, was awarded one of six top prizes at the National Science Fair-International in Kansas City, Mo.

Hedge apple trees produce large quantities of yellow, rough-surfaced fruit, four to five inches in diameter. Although the wood of the tree has been used for Indian bows, railroad ties, fence posts and wheel stocks, Miss Richards found no record of any practical use for the fruit.

She first disproved a widely held theory that the fruit is poisonous by injecting a filtered solution of ground Osage orange and water into five mice. No ill effects resulted.

Next, the fruit's general food value was determined by laboratory analysis. A dried composite sample was shown to contain 10.75% protein, 2.95% moisture, 23.48% fat, 4.45% mineral, 7.93% fiber and 29.4% sugar.

Since the fresh fruit itself is tough, sticky, and not especially tasty, Victoria dried and powdered it to test its potential as animal food. Mice ate hedge apple mixed with powdered egg, and guinea pigs sampled it with alfalfa pellets, but neither showed appreciable weight gain. The young researcher's best results were with baby chicks, which thrived on a diet of powdered hedge apple mixed with chick starter—although it took a few days for them to become accustomed to the taste.

Victoria then tried her hand at preparing food for human consumption. Cookies made of 50% hedge apple and 50% flour had a good texture, a pleasant odor, and "a strange, but palatable, taste," she reports. A coarse-textured bread, using 25% hedge apple and 75% flour, had similar characteristics. Roasted hedge apple seeds were found "pleasantly edible" with salt and butter added.

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Single Nerve Fibers

➤ A 16-YEAR-OLD STUDENT scientist from Eau Gallie, Fla., reportedly has developed a new technique for keeping single nerve fibers alive and functioning in tissue culture for several weeks.

The project was displayed as an exhibit at the National Science Fair-International in Kansas City, Mo., by Christopher George Cherniak, a junior at Melbourne High School, Melbourne, Fla. It attracted wide

Christopher George Cherniak

interest from representatives of the medical profession and the Armed Services.

Christopher's exhibit won him an NSF second award, as well as special first place awards from the American Medical Association, the Army, the Air Force and the Navy. The Armed Services are said to be speculating on the technique's possible uses in studying nerve gas effects.

Christopher said he was led to undertake his research by the fact that no technique existed for maintaining single nerve cells outside of an animal, or for observing their functioning continuously.

After culturing lengths of a frog's sciatic nerve, he developed an apparatus and a nutrient solution to keep the nerve alive, and monitored the nerve's electrical activity. No damage resulted to the nerve, he explained.

The boy next used a second special apparatus to culture single nerve fibers taken from the leg and motor nerves of horseshoe crabs and blue crabs. They were isolated from the motor nerve bundles, mounted in the culture "with a minimum of injury," and kept free of bacteria, he reported.

Subsequent monitoring of electrical activity, comparing the actions over a period of time, showed the nerve did not deteriorate in functioning. The dissected single nerve fibers, when assembled, were kept functioning in the culture as reflex arcs for several weeks, Christopher said. His technique, he asserts, has the advantage of allowing observations of the nervous system in its component parts, yet with the parts still functioning together as an integrated whole.

Environmental variables thus can be minimized in studying simple behavior, and the neurons can be identified in terms of their functional characteristics.

His eventual goal is the use of networks of living nerve cells for the study of primitive behavior in invertebrate animals.

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ORNITHOLOGY

Fighting the Starling Menace

Starlings have been harassing Americans for 70 years. It may take the most sophisticated devices of the 20th century to teach them better manners, Gloria Ball reports.

▶ THERE ARE HUNDREDS of millions of starlings in the United States, and supposedly the whole thing started with William Shakespeare.

In 1890, Eugene Schieffelin, a gentleman who wanted to introduce Americans to every bird mentioned in Shakespeare's works, released 60 European starlings in New York's Central Park. The next year he brought over 40 more, and from that beginning, the starlings took over the country.

For about five years the birds stayed within greater New York, but by 1900 they were nesting in Connecticut. Like a creeping menace they spread to Rhode Island in 1910, Virginia in 1920 and Washington, D. C., in 1922.

By 1929 officials for the Hoover inauguration were worrying about starlings along the parade route, and farmers in Wisconsin, Kansas and Texas were trying to keep them out of cattle feed lots. Ten years later they had pushed into Mexico and Canada, and the fruit orchards of Colorado. By 1957 they were swarming into the holly groves of Oregon.

In their wake was a nation of dirtied courthouses and irate citizens.

Throughout the 70 years that these gregarious and aggressive birds have harassed man, experts have been trying to keep them from roosting on and fouling public buildings.

When 63 persons died in the Electra crash at Boston's Logan Airport, however, the main menace of the starlings suddenly changed from dirt to death.

When investigators suggested that the crash was caused by starlings being sucked into the air intake of the prop-jet, a plane with a jet-driven propeller, bird experts took one look at the airport and marveled that such a disaster had not occurred sooner.

Dr. John W. Aldrich, ornithological consultant to the U. S. Fish and Wildlife Service's special task force, commented that Logan Airport is about the worst airport in the country so far as bird hazard is concerned. It juts out into Boston Harbor and is surrounded by mud flats and fishing wharves. It has marshy ponds in among the runways and there is a dump nearby. This attracts not only starlings, but ducks, gulls and shorebirds as well.

It may be that jet and prop-jet engines can be redesigned to reduce the danger of sucking birds into the intakes. But the birds themselves must be driven from the airports, and the Federal Aviation Agency has transferred $100,000 to the Fish and Wildlife Service to find out how to do it.

Among the promising plans are those that use sonic or ultrasonic devices. Since the range of bird hearing is approximately the same as human hearing, a scare device that operates on the dog whistle principle is out of the question. But it might be possible to use a sound that would cause irritation, pain or confusion in the birds. In Salt Lake City, for example, powerful radar beams twice confused a flock of geese so badly that they had to reorganize a third time and detour the airport.

Fish and Wildlife Service also is trying to find out if the starlings have behavioral quirks that could be used against them, as was done in the case of the gooney birds, or albatrosses, on Midway Island. In that situation, the birds were simply playing at their favorite sport, soaring. They were using the updrafts, created when winds run into sand dunes and shoot upward, to take a free ride. When the dunes were leveled, the birds lost interest.

A number of chemicals could be put to use. One is a birth control drug known as triethylenemelamine (TEM) which can prevent the hatching of so many young. TEM, unsuitable for human use because it damages human blood cells, is a gametocide, an agent that interferes with the formation of reproductive cells and renders both male and female birds sterile for about two months.

Its effectiveness, when mixed with feed spread out for birds a few days before the breeding season, is evidenced by the first field trials in which TEM reduced blackbird hatchings to 20% below normal. The problem in using TEM, however, is in finding a way to keep it away from desirable birds.

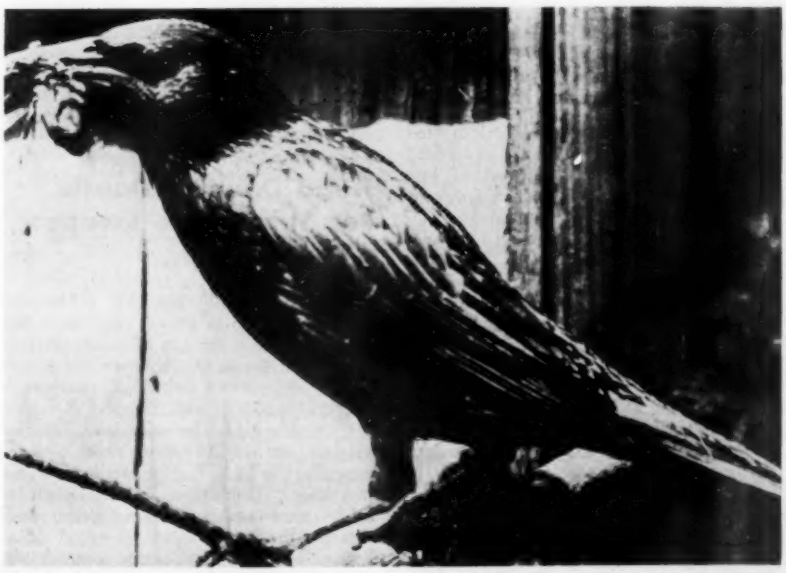
Other chemicals make the birds stagger for a short time as if drunk. They cannot fly or walk a straight line and are so helpless that they can be picked up by hand. Some utter distress calls which keep other birds away. Those who do get a dose of such a chemical supposedly will associate the drunken feeling with a certain roosting or feeding area, and presumably will avoid it.

If worst comes to worst, it may be necessary to kill some of the birds. This is not a satisfactory solution because the attraction will remain and the vacancy left by the dead birds will only be filled by other starlings.

If it must be done, however, the best way may be to use poison gas and the light trap, a device presently used for trapping and banding. It consists of a funnel of netting rigged up behind a roost. Bright lights are placed behind the net and when the birds are frightened from the roost, they fly toward the lights, right into the trap.

In 15 to 20 minutes, 75,000 starlings can be trapped by this method. Caught in a canvas bag at the bottom of the funnel, the birds could be killed with poison gas in just a few seconds. It would take only a small amount of hydrogen sulfide or auto

(*continued on p. 351*)



THE GOOD ENEMY—Although hated and hunted for its misdeeds, the starling is a help in keeping insect pests under control. Here a starling holds a Japanese beetle.

MEDICINE

Most Dying Patients Should Be Told Truth

➤ A DYING PATIENT often should be told the truth about his condition, physicians at the American Psychiatric Association meeting in Chicago were advised by Drs. Thomas P. Hackett and Avery D. Weisman of Harvard Medical School.

A silent conspiracy between family and physician to hide the truth from a dying patient condemns him to a premature burial by isolating him from the living long before he is dead, the physicians said. The most agonizing aspect of dying is being separated from those one loves and respects.

The patient who is not able to face the truth that he is about to die will go on believing that he is going to get well despite the facts the physician lays before him. For this reason, the truth will not hurt the dying patient.

The ability of a physician to handle psychologically the dying patient depends partly on his success in dealing with his own unconscious fears of death, another psychiatrist, Dr. Charles William Wahl of the University of California Medical Center, Los Angeles, reported at the meeting.

• Science News Letter, 79:344 June 3, 1961

MEDICINE

Proposal Made to Change Foreign-Doctor Program

➤ FOREIGN MEDICAL SCHOOL graduates should be allowed to take the required examination to serve as interns or residents in American hospitals six months after they come to this country, a New York physician has proposed.

Dr. Edward Kirsch, chairman of the intern and resident committees of the Greater New York Hosiptal Association and the Hospital Association of New York State, outlines his proposal in the Journal of the American Medical Association, 176: 603, 1961.

The establishment by the American Medical Association of the Dec. 31, 1960, deadline (now temporarily extended to June 30, 1961) "has received much critical comment by foreign medical graduates and medical staffs in many American hospitals," Dr. Kirsch said.

During the six-month waiting period proposed, a foreign medical graduate could get instruction in an approved hospital, including instruction in English, American medical terminology, basic medical sciences and the major clinical specialties.

Other reports included in the official AMA Journal are:

The milk diet is obsolete in the management of peptic ulcer because of the availability of excellent antacid preparations and the possibility that excess consumption of milk products is detrimental to the coronary arteries. This report was in answer to a question by Dr. G. L. Bauer of Belleville, Ill.—Dr. William H. Bachrach, University of Southern California, Los Angeles (p. 642).

A new antibiotic tested on 4,704 patients has shown side effects in less than a tenth of the persons studied. There were 721 patients who had been treated unsuccessfully with other anti-infective measures who responded to demethylchlortetracycline (Declomycin).—Dr. Franklin M. Phillips and Joel L. Shapiro, Lederle Laboratories, Pearl River, N. Y. (p. 596).

The closed-chest method of heart massage, which originated at Johns Hopkins University, Baltimore, has been reported effective in restoring the heart beat of 62 patients. Artificial respiration should precede and accompany heart massage, however, because restored heart beat without breathing is futile, and many patients recover after artificial respiration alone.—Drs. Peter C. Gazes and John A. Boone, Medical College of South Carolina, Charleston; and Drs. Peter Safar, Torrey C. Brown, Warren J. Holtey and Robert J. Wilder, Baltimore City Hospitals and Johns Hopkins School of Medicine (pp. 574 and 621).

• Science News Letter, 79:344 June 3, 1961

MEDICINE

Cortisone Hinders Fight Against Viral Diseases

➤ A CHEMICAL QUIRK of cortisone allows it to hamper the body's fight against viral diseases, scientists have reported.

Cortisone can prevent cells from producing a virus-fighting substance called interferon, and can stifle the action of that which is already present. This allows the disease virus to grow more rapidly. In addition, Dr. Edwin D. Kilbourne, E. Marilyn Smart and Barbara Ann Pokorny of Cornell University Medical College, New York, report in Nature, 190:650, 1961, cortisone inhibits the helpful viruses sometimes injected to boost production of interferon.

Both actions of cortisone, the scientists believe, are the result of one chemical action, namely, cortisone's ability to influence protein synthesis.

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PUBLIC SAFETY

Hood Doubles Depth For Submarine Escapes

See Front Cover

➤ A SUBMARINE ESCAPE device will now enable men to get out of stricken submarines sunk as deep as 450 feet, or more than twice the practical escape depth now possible with other individual escape techniques.

U. S. Navy Lt. Harris Steinke, who developed the hood, set a depth-breaking record at the U. S. Navy Experimental Diving Unit, Washington, D. C., when he safely came up from the 450-foot level wearing the hood.

In the tank, seen on the cover of this week's SCIENCE NEWS LETTER, Navy chief Eugene Shipp prepares to repeat the test while Lt. Steinke watches.

• Science News Letter, 79:344 June 3, 1961

IN SCIEN

EDUCATION

Educational Strides Made But Need Still Acute

➤ DURING THE PAST ten years, American educators have taken impressive steps to solve the problem of educating increased numbers of students. But the challenge of raising the quality of education throughout the country is still critically urgent.

This is the conclusion reached by the Fund for the Advancement of Education after its first decade of supporting promising developments in United States schools and colleges.

The Fund, established by the Ford Foundation in 1951, has spent some $50,000,000 in grants for approximately 500 projects.

Fund president Clarence H. Faust emphasized the success of experiments aimed at improving preparation of teachers, providing more teacher aides, forming teaching teams, and increasing use of TV, films, tapes, slides and teaching machines.

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PHARMACOLOGY

Attacks Illegal Sale of Pep Pills, Barbiturates

➤ UNDER-THE-COUNTER sales of amphetamine (pep pills) and barbiturate drugs to teenagers were attacked in a bill aimed at putting teeth into the existing law.

Sen. Thomas J. Dodd (D.-Conn.), chairman of the Senate Subcommittee to Investigate Juvenile Delinquency, who introduced the bill, said the present Food and Drug law leaves a major portion of the underworld drug trade practically immune from Federal prosecution.

Under the provisions of his bill a violator caught in the act of unlawful sale could not escape conviction for lack of proof the drug had traveled in interstate commerce, as is now the case.

In amending title 21, U.S. Code, Sen. Dodd proposes two major provisions, neither of which calls for licensing. The first requires all manufacturers, compounders and processors of the drugs to list their names and places of business with the Secretary of Health, Education and Welfare.

The second provision requires every person selling, delivering or otherwise disposing of the drugs to keep a record of the kinds and quantity involved, including the name and address of the person to whom the drug is sold, except in the case of duly licensed medical practitioners.

The present situation, Sen. Dodd said, is more appalling in the cities throughout the country than prior to 1959 when amphetamine inhalers were commonly sold in drugstores without prescriptions.

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E FIELDS

ROENTGENOLOGY

X-Ray Diagnosis Aims to Prevent Heart Attacks

➤ THE PREVENTION of heart attacks is possible as a result of advances in X-ray examinations, two New York Hospital-Cornell Medical Center scientists told the American College of Radiology X-ray forum in New York.

Recently developed examinations and studies called "selective coronary arteriography" show the presence of coronary artery disease in a living patient. Previously the coronary arteries could only be seen at autopsy.

Dr. John A. Evans said it was now possible to follow the course of the blood through the arteries, thus obtaining knowledge through improved electronic equipment in addition to new understanding from X-ray examinations.

"Radiology can demonstrate the heretofore invisible," Dr. Evans said.

Dr. Edward I. Goldsmith said the greatest handicap in using surgical procedures for obstruction of the blood flow, which causes heart attacks, has been insufficient knowledge of the actual problem within the coronary arteries.

"The information received from the diagnostic X-ray examinations can now be used by the surgeon," he said, adding that the surgeon can select, "modify and develop" effective procedures. In this way he can try to alleviate the blood supply insufficiency and possibly prevent the occurrence of some heart attacks.

• Science News Letter, 79:345 June 3, 1961

TECHNOLOGY

Computers Now Demand Topnotch Human Brains

➤ TOPNOTCH human brains will be needed henceforth to make wise use of computers, Dr. John R. Pierce contended at the Massachuetts Institute of Technology, Cambridge, Mass.

Dr. Pierce is director of research in communications principles at the Bell Telephone Laboratories, Murray Hill, N. J. He gave the final lecture in a series on "Management and the Computer of the Future."

Somehow, he said, executives "with more ignorance than knowledge about the functioning of human beings" manage people now; in the future they will have to get along with computers, too. But, he emphasized: "Machines are not men. Just because a computer can do something a man might do does not mean that it should."

Although machines have played checkers and chess, he noted, you still can get equivalent performance cheaper by hiring a good checker or chess player. Similarly, it still pays to learn Russian if you want to know what the Russians are saying, even though machines have translated some Russian into English and much is being learned about languages from such research.

"Although machines can process data," Dr. Pierce said, "the results are no better than the data, and information may be lost in the processing.

"While machines can process the results of surveys, it takes a good social scientist to plan a survey, and a good statistician to evaluate the results.

"What computers should do depends not only on the computer and the problem, but on the ingenuity of the programmer."

Wise decisions about the use of computers, he concluded, cannot be made quickly or easily. "There is real doubt," he thinks, "whether they can be made by a man harassed with the routine of a large, multi-level organization.

"They certainly cannot be made by even a bright specialist in management unless that specialist is willing to devote years of hard effort to learning things quite outside of his specialty, things that have to do with machine and systems of machines, with data and information, rather than with organizations of people and human idiosyncracies. . . ."

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SOCIOLOGY

Violent Race Hatred Is Healed by Time

➤ THE ALABAMA DISORDERS focus new attention on race hatred, but for many years there have been places in the United States where Negroes could not live or travel in safety.

More recently, events in the Congo and other parts of Africa surprised the white man by showing him that there are parts of the world where he cannot go or live.

Hope for pacific race relations of the future lies in the little black republic of Haiti. As recently as the beginning of the 19th century, Haiti was torn by a revolutionary movement so violent that Negroes, infuriated by French treachery toward their leader Toussaint L'Ouverture and by injustices under slavery, engaged in a bloodthirsty massacre of all whites in Haiti.

Yet all this intense hatred for the whites was so far forgotten in 150 years that by 1950 no racial discrimination was evident. Visitors are served in the best restaurants, housed in the best hotels, permitted to swim on their world-famous beaches, and to dance beneath the stars and palm trees in the local version of night clubs.

Psychologists know that there is nothing innate in human nature to make persons of one skin color hate those of another hue. Race hatred develops when competition becomes too keen for jobs, for education which prepares for jobs, for freedom to move about or to live in one area or another. It develops when people come to fear one another either because of misunderstanding or deliberate misrepresentation by troublemakers. Race hatred is then "carefully taught" to children.

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MEDICINE

Strange Iodine Diversion Seen in Cancer Patients

➤ A STRANGE diversion of iodine occurs regularly in human cancers. The phenomenon was observed in all of 43 patients examined at the Fort Miley Veterans Administration Hospital in San Francisco, researchers told the American Cancer Society.

Drs. Kenneth G. Scott, W. A. Reilly and G. L. Searle of the Hospital and the University of California School of Medicine said much of the iodine stays in the blood stream or concentrates in cancers and other tissues, instead of going to the thyroid gland, as is normal.

The larger the tumor, the more iodine diversion, they said. Cancer patients' blood contained as much as 7.9 times the iodine in normal human blood. Their thyroids, on the average, took up only about 70% of the normal amount.

Checks of laboratory animals have shown that the tumor uses iodine to promote its own growth. It makes a miniature iodine-containing protein that can burst body storage cells and feed the tumor.

Substances in the storage cells include histamine and serotonin, known to promote tumor growth. Efforts to arrest lung cancer growth by giving anti-histamine and/or anti-serotonin drugs are being made at a few experimental centers. No reports on the treatment's value are yet available.

• Science News Letter, 79:345 June 3, 1961

DENTISTRY

Children Brush Teeth Where Red Stain Shows

➤ CHILDREN will soon be brushing their teeth where the red stain shows, Dr. Quinton E. Williams, dentistry professor at the University of Texas, has predicted.

The red stain results from a dye called erythrosin acting on decay-causing bacteria in the mouth.

The dye is swished around in the mouth and turns red on the places where bacteria have collected, Dr. Williams said. The child then inspects his teeth with the aid of mirrors, including a small dental mirror, and brushes away the red stains and the bacteria, a process that keeps the child interested and gives his teeth a thorough cleaning.

Dr. Williams uses the dye in his private practice, and said it has been approved as safe by Federal testing laboratories and soon will be available generally. He said that he first educates children and their parents with a movie showing how tooth decay begins; then gives each child the dye and a dental mirror, with instructions for their use.

Use of the dye and mirror results in the formation of good dental habits by the child and does it in an interesting and informative way, Dr. Williams reported at a local meeting of the American Society of Dentistry for Children in Milwaukee, Wis.

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GENERAL SCIENCE

Challenge of Space Age

The space age has brought together physics, astronomy and the earth sciences to form an area of research of its own. The greatest achievement will depend on future scientists.

By. DR. ROBERT JASTROW

Chief, Theoretical Division, Goddard Space Flight Center, National Aeronautics and Space Administration.

An address given at the awards banquet of the 12th National Science Fair-International in Kansas City, Mo., May 12.

➤ IT IS AN HONOR to speak at the 12th National Science Fair-International, and to address the young men and women who have earned the privilege as winners in state and regional science fairs of displaying their science projects in this national competition. We wish to congratulate the SCIENCE SERVICE also, and the Science Clubs of America, who have made this outstanding National Science Fair possible.

I know you shared with me and all Americans a strong feeling of pride and excitement on May 5, when we sent the first American astronaut into space and back safely to earth. That was a great achievement, the first major step in our program for the manned exploration of the planets, and the harbinger of important events to come.

These are remarkable times, both for us already engaged in research, and for you who are now discovering the basic structure of science. There has been an explosion of energy in the new field of space research, a field which came into existence only three years ago, but has already brought together large areas of physics, astronomy, and the earth sciences to form an area of research with a character and integrity of its own. The rate of growth in this new discipline has been phenomenal. In 1958, a single scientific monthly, the Journal of Geophysical Research, published a half dozen papers in space science. In 1959 this same monthly published approximately 60 articles in the field, and in 1960, no less than 120 articles.

Scientists Respond to Challenge

This volume of activity represents the response of scientists to the opportunity and the challenge provided by rockets and spacecraft which can carry apparatus weighing several hundred pounds into orbit above the atmosphere and out into interplanetary space.

These spacecraft permit us to obtain information which we could not get on the ground. They open up new avenues of attack on some of the most important scientific problems to occupy the mind of man—problems related to the manner in which the sun controls the atmosphere of the earth; to the properties of the moon and the planets, to the origin and the history of the solar system; and to the structure of the universe in its most distant regions.

Our government and our scientists, in collaboration with the scientists of the United Kingdom and other countries, are responding to these opportunities with a remarkable display of energy and imagination. In a series of 19 elaborately instrumented scientific satellites and space probes launched during the last three years, we have examined the properties of the upper atmosphere and its extension into the interplanetary medium, and unraveled the complex and significant history of the relation between atmospheric properties and the solar outbursts; we have taken photographs of the earth from above, which reveal patterns of organization in the cloud cover over areas hundreds of thousands of square miles at one time and are rapidly advancing our ability to forecast the weather; we have charted the deviations of satellite orbits from their expected paths, determining thereby the irregularities in the gravitational field of the earth, and acquiring an understanding of the structure of our planet in its deep interior which could not be gained by surface means and most recently we have launched a gamma-ray telescope into orbit, designed to reveal the sources of energetic radiation in the sky, previously hidden from us by the blanketing effect of the earth's atmosphere.

Contribute to Astrophysics

Among these many projects in the National Aeronautics and Space Administration science program, astrophysics is an area to which we can make a unique contribution. All the information we have about the stars and galaxies in the distant regions of the universe comes to us in the form of starlight reaching the surface of the earth. This light is collected by large telescopes, dispersed into a spectrum, and photographed to tell us the composition, the temperature, the speed of motion, and other basic characteristics of the stars and interstellar gas and dust between them. That is how we obtain the knowledge we now possess regarding the universe around us.

This information which can be collected on the ground is pitifully meager because the atmosphere of the earth is an absorbing curtain, which screens out most of the starlight reaching us, permitting only a small band in the visible region and a certain amount of the radio region to arrive at the ground. We can study the full spectrum of incident starlight and thereby immeasurably increase the understanding of the entire universe, if we can mount a telescope in a satellite and place it in orbit above the earth's atmosphere.

For the first time in the history of science we now have the ability to do precisely that, and the development of the satellite telescope, called the Orbiting Astronomical Observatory, is one of the major projects of the NASA science program. It will take several years to perfect the techniques of guidance and control for pointing the telescope accurately from its satellite mount, and other problems that must be solved for the orbiting telescope, but when they are surmounted, the satellite observatory will be one of the most important contributions that the space program can make to science.

The coming NASA investigations of the moon and the planets are both scientifically important, and perhaps the most exciting of all to the general public, because they involve the direct physical exploration of virgin territory, in the spirit of the voyages of discovery and exploration in the sixteenth and seventeenth centuries by which we came to know our own planet.

Moon Explored First

The first extraterrestrial body to be explored will undoubtedly be the moon, which is the earth's nearest celestial neighbor. Mars and Venus are 100 times more distant, and a rocket that could reach the moon in a day or two could take months to arrive in the vicinity of one of these planets. An instrument station on the moon could also communicate with the earth more easily than one on Mars or Venus. The moon is a way-station en route to the planets, and a testing ground for the development of rocket technology and scientific apparatus required for the exploration of the planets.

The moon is a body whose surface has probably preserved the record of its history remarkably well, and better in fact than either Mars or Venus. For this reason, the moon is a particularly interesting object to the scientist, quite apart from its role in the technological development of the space program. It is a Rosetta Stone of the solar system, whose surface holds a key to the history and development of planetary bodies. The exploration of the moon will provide otherwise unobtainable clues to the manner of formation of the solar system, some four and a half billion years ago, and to its subsequent history.

In the first decade of the lunar exploration we will rely on unmanned spacecraft. The first major flight in the unmanned program is expected to take place in less than a year, when a spacecraft known as the Ranger is launched toward the moon on a trajectory which will carry it to an impact in the vicinity of the craters of Copernicus and Kepler. Ranger is now under development in the Jet Propulsion Laboratory of the California Institute of Technology. On approach to the moon's

surface, it will obtain a series of TV images and relay them to the earth by radio. The last of these photographs should have a resolution of details on the surface hundreds of times better than obtainable on earth.

It will contain other instruments, including a seismometer designed to survive the shock of impact and to transmit back to earth data on the level of earthquake activity within the moon's interior, which can be analyzed to determine the moon's internal structure. Later and more advanced spacecraft, to be launched with rockets of greater thrust, will be able to deposit instruments gently on the surface of the moon for sophisticated physical and chemical tests of its surface.

Manned Flight to Moon

When manned flights to the moon become possible, we will reach the culminating and most rewarding phase of the lunar exploration. An extended period of engineering and scientific development will be necessary before we can achieve manned flights into space. The first step towards that goal is represented by the Mercury project which has as its objective the orbiting of an astronaut around the earth, and his safe return. The Mercury project involves the training of astronauts; research and development on life support and safety systems; recovery of the space capsule; and the critical problem of re-entry of the space capsule into the atmosphere after the orbiting of the earth.

Orbiting of the Mercury space capsule, now that we have successfully achieved a sub-orbital flight test, will be our next big step forward. Then subsequent to the orbiting of the manned spacecraft around the earth, there is planned a manned spacecraft known as Apollo, which will carry crews of two or more astronauts; weigh 15,000 to 20,000 pounds; provide living quarters with limited freedom to move about and carry out scientific observations in the capsule and assure sufficient flight duration and maneuverability for missions varying from earth orbiting, to moon orbiting, and return.

These are the achievements and potentialities of the space program in basic science; in addition, in the course of several years, earth satellites will make extremely important contributions to applied science, in the fields of communications and weather forecasting, with direct and immediate gains for the economy of this country and of the world.

Satellites for Radio and TV

Today the capacities of international telecommunications and cable systems are burdened by present needs and will be exceeded by tomorrow's demands. Conventional terrestrial television signals cannot be transmitted directly more than 200 or 300 miles. Even though ground-based microwave relay links and coaxial cables overcome range limitations, they are impracticable, unreliable, or prohibitively expensive for overseas communications.

Such programs as NASA's project Echo (the "passive" or non-instrumented balloon satellite many of you have seen passing overhead) have demonstrated that satellites can be used to reflect teleradio and TV signals.

NASA's planned project Relay will involve the launching of "active repeater" satellites into space, which, with their electronic instruments, will relay messages from the earth to other active repeater communication satellites and back down to the earth at the desired terminal point.

NASA's successful meteorological satellites, Tiros satellites I and II, have already observed and transmitted more than 44,000 television pictures of the earth's cloud patterns and taken infrared measurements of the heat of the earth and its atmosphere. These meteorological satellites are the first steps in aiding us to understand better the atmospheric processes which produce our weather and climatic changes.

Weather Research

At present our meteorological observations from the ground and from balloons only can provide us with a 20 to 30 percent coverage of weather phenomena, mostly from the Northern Hemisphere and the underside of the atmosphere. Extensive areas are not yet covered by weather observations, and constitute regions in which storms can be generated and grow without detection, before they move over inhabited areas. These gaps will be filled by a weather satellite system.

The significance of these projects is sometimes lost in the international competition over rocket thrust, but it must be remembered that it is the scientific achievements, in both manned and unmanned flights, which deepen our understanding of the nature of the universe and the causes of natural events, and which are the enduring contributions of space research to society. It is this progress in our understanding of the world around us which you, who are embarking on careers in science, must always keep before you as your principal goal.

Future Rewards in Space Science

The discoveries in science which you achieve will have an enormous effect on our lives in the future. We have entered a period of rapid scientific progress, in which the rewards can be very great, but the responsibilities are very heavy. The scientists of my generation have already made a start towards the realization of the potential benefits of space research. But we are working with very crude tools in the Model T era of the space age.

Our greatest achievements are still ahead of us, and our success will depend entirely on the scientific and engineering talent of your generation. These are great opportunities and a great challenge, both for you and for the schools and universities from which you will obtain your training. I congratulate you again as regional and national winners, and I wish you every success in your future efforts.

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• Books of the Week •

For the editorial information of our readers, books received for review are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C.

ARCHAEOLOGY AND SOCIETY: Reconstructing the Prehistoric Past—Grahame Clark—*Barnes & Noble*, 272 p., illus., paper, $1.95. Reprint of archaeologist's description for the general reader of how archaeologists go about their work, generously illustrated.

FOCUS ON CHANGE: Guide to Better Schools—J. Lloyd Trump and Dorsey Baynham—*Rand McNally*, 147 p., illus., paper, $1.25. See story p. 351.

AN INTRODUCTION TO THE PRINCIPLES OF COMMUNICATION THEORY—John C. Hancock—*McGraw*, 253 p., $9.50. Basic textbook on probabilistic methods, noise and information theory at the undergraduate level.

THE LANGUAGE OF SCIENCE: A Guide to Effective Writing—William Gilman—*Harcourt*, 248 p., $4.95. Explains the basic rules of writing effectively on scientific or technical subjects, giving many practical examples of good writing and of bad writing, and shows how it can be improved.

MACHINE TRANSLATION: OTS Selective Bibliography—*OTS*, 5 p., 10¢ direct to Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. Lists recent U. S. research reports and translations of Russian reports.

MANUAL OF PHOTOGRAPHIC INTERPRETATION—Robert N. Colwell, Ed., preface by G. C. Tewinkel—*Am. Soc. of Photogrammetry*, 868 p., photographs, $15. Comprehensive treatment of aerial photo interpretation in geology, soil science, engineering, forestry, wildlife and range management, agriculture, urban area analysis, archaeology, hydrology and geography.

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PESTICIDE HANDBOOK, 1961—Donald E. H. Frear, Ed.—*College Science Pubs.*, 13th ed., 285 p., $3.50; paper, $2. Information, including current legal tolerances, on more than 9,000 insecticides, herbicides, rodenticides and other agricultural chemicals.

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INVENTION

Patents of the Week

An emergency lock for protection against car thefts has been patented. A control device for missiles and runway lights for safer landings of airplanes were invented.

➤ THIEVES attempting to steal unattended parked cars should be foiled by an "emergency lock" awarded patent No. 2,984,318, inventor James A. Mathews of Michigan City, Ind., stated.

A perforated disk attached near the drive shaft immobilizes the drive shaft when a bolt is inserted in one of the holes. The bolt is controlled by a cable that extends to the dashboard.

A control device that guides a diving deadly missile just before it hits the target was patented by Winston O. Faith and Albert E. Wasserman of Arlington, Texas, and Howard W. Prier of Dallas, who assigned rights for patent No. 2,984,435 to Chance Vought Corporation.

The "guidance control system" provides greater accuracy in striking the target by correcting errors caused by winds above the target, the patent stated.

Previous missiles often disintegrated in midair because of the great strain exerted on the missile when it was turned toward the target.

Runway lights illuminating the center line of an airstrip won patent No. 2,984,735 for Sidney A. Batterson of Newport News, Va., who assigned the rights to the National Aeronautics and Space Administration. The inventor got his idea when recent flight tests indicated that most aircraft can land safely in near zero ceiling and visibility, provided the center line is lit up. A light reflector set at an angle to the runway neatly folds flush with the runway when an airplane wheel accidentally strikes the light.

Another safety feature patented is claimed to prevent a plane from overrunning a landing strip. The invention won patent No. 2,984,438 for Friedrich A. A. Arnold of Amityville, N. Y. A grid of electromagnetic cells placed near the end of a runway slows down an oncoming plane when a magnetic "ski" is lowered from the plane. The magnets in the runway strip "pull" the airplane to a quicker stop in a shorter distance.

• Science News Letter, 79:350 June 3, 1961

BIOCHEMISTRY

New Anesthetic Theory

➤ A THEORY of how anesthetics bring about unconsciousness was proposed by Dr. Linus Pauling, Nobel laureate professor of chemistry at the California Institute of Technology.

Dr. Pauling's concept is that the anesthetic action is upon the fluid part of brain tissue, which makes up about 80% of the brain. This is contrary to earlier theories based on the idea that anesthetic agents act by dissolving fatty brain substances.

Unconsciousness is caused, according to Dr. Pauling's theory, by the action of anesthetics in causing the formation of submicroscopic crystals that interfere with the electrical activities of the brain.

When the brain fluid is cooled to 81 degrees Fahrenheit, microhydrate crystals are formed from its normal constituents. This causes complete anesthesia in the absence of any anesthetic.

Unconsciousness is brought about at body temperature (98.6 degrees Fahrenheit) by the use of an anesthetic. This is due to the fact that the molecules of the anesthetic enter the hydrate crystal structure, causing the crystals to form at the higher temperature.

Dr. Pauling estimated that only one-tenth of one percent of the aqueous or fluid material of the brain need be converted into tiny crystals to bring about unconsciousness and insensitivity to pain.

As evidence to support his theory, the scientist pointed out that mixing chloroform or another anesthetic with water causes the formation of minute crystals and that there is a "striking parallelism between the concentration of the anesthetic gas required to form the hydrate crystals in the laboratory, in the absence of brain tissue, and the concentration of the gas required to produce anesthesia."

The new theory is the first detailed one based on molecular properties of anesthetic agents. Dr. Pauling said that the effectiveness of anesthetic agents is proportional to the calculated energy of attraction of their molecules for water molecules, as is required by his theory. This explains why divers become unconscious from nitrogen while breathing air under high pressure, he reported. When the divers are at considerable depth and the concentration of nitrogen is sufficient in the brain tissue, molecules of this element stabilize hydrate microcrystals.

This effect is prevented by replacing the nitrogen by helium, because helium atoms have a very small attraction for other molecules and do not stabilize the formation of hydrate microcrystals, he said.

The molecular theory of anesthesia was developed by Dr. Pauling while he investigated the chemical basis of mental disease.

• Science News Letter, 79:350 June 3, 1961

EDUCATION

New Patterns Set for "School of Tomorrow"

➤ PROMISING STUDENTS in America's "school of tomorrow" should be allowed to devote as much as 40% of their school time to creative, independent work and study.

The suggestion comes from the Commission on the Experimental Study of the Utilization of the Staff in the Secondary School. Their summary report, based on a five-year survey, calls for drastic revamping of present schools.

"Few high school graduates have achieved adequately the skill of independent study, nor has much happened to make them feel that they should," the Commission believes.

Under the new plan, opportunities for independent study would vary with each student's age and ability, and the stage of the transitional program in each high school.

Also stressed is the need for revising size of classes to make some much larger and some much smaller.

The theory is that 40% of the student's day should be spent in classes ranging from 100 to 300 members. These large group classes would be conducted by a teacher especially competent in some phase of the work at hand, or would feature film or TV programs.

Small group discussions would be held in classes of 15 or less.

Other recommendations are:

More staff help to keep professional teachers from wasting time on routine tasks. New design standards and equipment for outmoded schools.

More emphasis on individual student needs by dividing into stages or steps rather than years or grades.

Offsetting individual differences in teachers through "team teaching" and differing work loads, with salaries adjusted accordingly. Top-rated teachers would earn as much as $15,000 to $20,000 annually.

Wiser use of available funds—reduction of interscholastic competitive events is cited as an example.

The Commission's report, published by Rand McNally and Co. as "Focus on Change: Guide to Better Schools," ($1.25) includes a how-to-do-it chapter listing specific steps schools should take now.

The work was sponsored by the National Association of Secondary-School Principals, and financed by the Ford Foundation and the Fund for Advancement of Education.

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Fighting the Starlings

(*continued from p. 343*)

exhaust gas to kill the starlings, for, like the canaries once used to warn miners of dangerous carbon monoxide levels, they are extremely sensitive to noxious gases. Still, few are in favor of killing a bird if it can be chased away instead.

The Fish and Wildlife Service, now engaged in something of a crash program, is hoping to find a debirding scheme that can keep starlings off buildings as well as runways.

Between 20 and 30 different methods of outsmarting the "blizzard of birds" that comes into the city to roost have been tried, and nearly every one has been a colossal flop.

Roman candles, balloons and loud noises work in isolated cases. Recordings of starlings in distress, eagle screams and rifle shots do also. But after a few days, the birds usually treat the objects or noise as part of the fascinating city din.

Electricians have even rigged up ultraviolet lights designed to give the birds a ghostly appearance. The starlings were supposed to frighten each other, but instead, they soaked up the light as if it were sunshine.

Plaster-of-Paris cats with mirrors attached, stuffed owls and rubber snakes have been set up on roosting ledges and trees. After a short time, the birds admire themselves in the mirrors, ignore the snakes and perch on the owls. They have even disdained roosting boxes in parks heated with bright lamps. Apparently they prefer a drafty ledge.

About the most that can be said for the failures is that they at least provide a list of things that will not work.

In most cases recorded starling distress calls have been an unsuccessful scare device. Experts believe, however, that they have not been used to the best advantage. The calls should be played, they state, at the beginning of the season, before roosting areas are established.

One technique that has been successful is the electrical hotfoot, accomplished by stringing two wires along perches. Another is that of mounting metal or wooden runners at a 45-degree angle to the perching surface, a trick that makes the birds slide right off the roost. Applying a greasy substance also does the job. It leaves the building in a sticky mess, but at least the birds object to the feel of the grease on their feet.

All of these successful methods are expensive.

For all the trouble the starlings cause, they have their good points. They eat various insect pests, such as Japanese beetles, and can sing like meadowlarks if they care to do so. Supposedly, they can imitate 44 different birds.

But their normal voice reflects the way most Americans feel about them—"feee-u."

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Questions

GENERAL SCIENCE—How large was the money allocation for research and development in reporting colleges in 1958? p. 340.

PUBLIC SAFETY—How far are sharks able to smell blood? p. 338.

SPACE—What are two disadvantages of a high-altitude 24-hour satellite? p. 339.

Photographs: Cover, U. S. Navy; p. 339, Bell Telephone Laboratories; p. 341, British Information Services; p. 342, Science Service; p. 343, U. S. Department of Agriculture; p. 352, Beulah Harris Stolpen.

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SPECIAL-CHARACTER KEYS adaptable for all typewriters solves problem of normally unavailable symbols, letters and superscript numbers when typing. Typewriter adapter is inserted in typewriter and odd-character key, fitted with plastic handle, allows typist to complete entire operation in just four seconds. About 400 characters are available.

• Science News Letter, 79:352 June 3, 1961

FIRST AID DRESSING that does not stick to a wound is recommended for larger cuts, burns and scrapes. Crescent-shaped openings on dressing's inner surface continually open and close, draining fluid from wound to an absorbent pad. The flesh-colored, four-layered pad aids healing by keeping the wound in a semi-dry condition.

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SPACE HELMET for future astronauts among the younger set is a walking communications center. The plastic helmet can send radio signals, broadcast messages a quarter mile, or send a code by blinking red and green lights. The battery operated control unit, complete with signal key and switches, hangs from a strap around the child's neck.

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ROLLING READER, shown in the photograph, consists of seven cubes and a plastic tube or roller. The words and numbers on the cube faces challenge young children to form sentences from words turning up on each roll. With more than 500,000 sentences possible, the game also encourages quick thinking by providing a two-minute hourglass timer.

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PORTABLE TENNIS TABLE can be folded up and rolled out of the way when not in use. The full-size regulation table that folds to a 7½-inch width has special net brackets that fold against table so net need not be removed when table is put away.

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BED PILLOW of urethane foam is nonallergenic and can be washed easily in the home laundry. Urethane foam is resilient so that pillow will not flatten out or become matted. Mothproof, mildewproof and odorless, the pillow comes enclosed in zippered or sewn cotton covers.

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SAFETY WARNING LIGHT for after-dark emergency use by motorists has a plastic red and amber dome. The battery-operated light, which flashes 60 times a minute, can be seen 1,000 feet away. The light, which has a magnet in its base, is placed on the car's metal surface or on the road.

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THREE-DIMENSIONAL WALL COVERINGS of vinyl plastic create realistic effect of walled stone or brick in rooms. The wall covering is stain-resistant, easily cleaned, and comes in interlocking sheets readily applied to walls. Designs include used brick, harlequin and Peruvian stone patterns.

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Nature Ramblings

➤ FROM TOP to bottom, the iris plant is a curious specimen. Its flowers grow inside out and its leaves never open out to full width.

The stiff, sword-shaped leaves of the iris are turned edgewise toward the stem, and not, as in other plants, with the flat side facing upward.

Besides, the stem seems to come from the inside of the leaf, which clasps its base.

The reason is that the iris leaf is really folded in the middle, with its upper surface grown together inside, so that what seem to be the two sides of the leaf are really only two halves of the back.

In the iris flower itself, the outer parts are really the inner ones and vice versa. The three "falls," or petals that project outward and then droop down, have their bases set inside the three bases of the "standards," or upright members of the flower.

These standards are really not petals, but very changed sepals—parts which in other flowers, such as apple blossoms, are just

Iris

pointed small green structures under the petals.

Most of the iris species found in American gardens are imported hybrids. But several native species still grow wild, the most familiar being the larger blue flag, which thrives from Newfoundland to Manitoba and southward.

Whether wild or cultivated, most irises prefer moist or marshy places. One notable exception, however, is the colorful iris of Palestine which grows in arid soil baked hard as a brick by the sun.

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Do You Know?

Most early *elevators* were operated by steam engines.

A modern electronic *computer* can add two five-digit numbers in as little as forty-millionths of a second.

In 1960 the *farmer* received only 39¢ of the dollar spent by the consumer for food, compared to 51¢ he received in 1947.

Three-fourths of the calcium, nearly half of the riboflavin and one-fourth of the protein in America's *food* supply comes from milk.

Cleft palate patients with no teeth now will be able to correct their *speech* defects satisfactorily using a magnetic device recently created.

Although air-breathing *fish* are found in North America, they are much more prevalent in the tropics where water often is deficient in oxygen.

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